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prehend them; and the details of bird life are so told that the reader cannot fail to gain an idea of what things the experienced naturalist looks for, and what he sees.

'The Bird Book' is divided into four parts. A dozen or so descriptive sketches under the title 'Water-birds in their Homes,' are followed by explanations of such matters as the structure, mechanism and use of birds' feet, wings and bills, and the adaptation of their different forms to habits. Then other, more philosophical subjects are unfolded, and made surprisingly plain, such as the principles of classification, the conditions of the struggle for existence, distribution and migration; and the concluding chapters are devoted to detailed accounts of some habits of birds, as 'How the Hawk Eats his Food,' 'The Cave Swallow's Changes in Nest-building,' 'How the Shrike Hunts.'

'The Woodpeckers' is, in form, more a popular monograph of that group of birds. After several chapters on the habits of woodpeckers in general, five widely distributed and representative North American species are taken up in turn, and the characteristics of each discussed. Following this, the peculiarities and uses of the woodpecker's bill, foot, tail and tongue are studied, and then attention is drawn to the modifications of these organs in different genera and to their remarkable adaptation to the specialized habits of each. The volume is concluded by a key for the identification of all the North American woodpeckers.

The books are well written. The style is never dull, and often brilliant. They are abundantly and, on the whole, well, illustrated; and 'The Woodpeckers,' in addition to various figures in the text, contains five colored plates.

It should be added that throughout both volumes the author is remarkably successful in carrying out their evident underlying purpose—not merely to convey information and inspire interest, but to cultivate in the beginner, by example rather than precept, a truly scientific spirit, both in his observations and in his deductions.

C. F. B.

Engineering Chemistry, a Manual of Quantitative Chemical Analysis for the Use of Students, Chem-

ists and Engineers. By THOMAS B. STILLMAN. Second edition. Easton, Pa., The Chemical Publishing Co. Pp. 22 + 503. Price, \$4.50.

The first edition of this book appeared in 1897. Its usefulness is indicated by the fact that a second edition is required so soon. The work seems to be designed to serve several purposes. The first portion, especially, appears to be intended for the use of students beginning the subject of quantitative analysis. The exercises selected in this portion are satisfactory, but the directions lack that careful detail in regard to methods of manipulation and in regard to the properties of the compounds used in analysis, which are so necessary for the student who is to acquire any adequate knowledge of the subject. It may be objected, of course, that room could not be found in this book for such details. It would seem, however, that these exercises at the beginning should have been omitted altogether or they should have been properly given.

The chemist or student who has already acquired a knowledge of analytical methods will find very much throughout the book that will prove very useful. The subjects discussed cover a wide range, the more important being the analysis and filtration of water, the analysis of coal, gas and other fuels, calorimetry, iron and steel analysis, blast furnace charges, analysis and tests of cements, analysis of clay, alloys, paper, soap, oils, paints and asphalt, pyrometry, electrical units and energy equivalents.

The writer is well aware of the large amount of labor which an author must give to the study of the literature of each topic in writing a book of this kind, in order to determine what is the best present analytical practice, and some mistakes are to be expected. In several cases, however, it would seem that better methods or more accurate directions might have been easily found. Thus, under coal analysis, in giving Eschka's method for sulphur, nothing is said about the danger of absorption of sulphur from an ordinary gas flame; for phosphorus in steel the method of Dudley and Pease is given, although that method has since been modified in several important particulars, and made more accurate without increasing the time required for its execution; for total carbon in iron, solu-

tion with the use of neutral copper sulphate is recommended instead of the acid solution of the double chloride of potassium and copper, which has been shown to be more exact by the American Committee on Standard Methods.

With revised tables of atomic weights, published annually by both the American and German Chemical Societies, it seems hard to find an excuse for a list which includes such values as Al, 27.5; Mg, 24.0; Si, 28.0; Cr, 52.5; Zn, 65.0. Antiquated values are also given for the specific gravity and weight of one liter of hydrogen.

While defects in the book have been pointed out at some length, it would be unfair not to refer to the large amount of valuable material to be found in its pages.

The frequent tables of analysis for commercial products give, in concise form, directions which will be very useful to the working chemist. The specifications for many substances used by railroad companies form a unique and excellent feature. And, while pyrometry, electrical units and energy equivalents do not properly belong in the domain of chemistry, many chemists will find them useful.

W. A. NOYES.

Ausgewählte Methoden der analytischen Chemie.

Von PROFESSOR DR. A. CLASSEN. Erster Band unter Mitwirkung von H. Cloeren. Braunschweig, Friedrich Vieweg und Sohn. 1900. 18mo. Pp. xx + 940. Figs. 78. Price, M. 20.

Notwithstanding the astonishing number of books bearing upon analytical chemistry which appear yearly, it is probably within bounds to say that, until recently, only those of Fresenius, Böckmann, Bolley, Post, and possibly that of Crookes, have generally been regarded as fulfilling the requirements as to scope and reliability of a satisfactory book of general reference. In the last few months, however, three works of wide range and excellent promise have appeared—namely, those of Carnot (*'Traité d'analyse des substances minerales'*), Lunge (*'Chemisch-technische Untersuchungs-methode'*) and this work of Classen. Classen's work differs, however, from those of Lunge (a continuation of that of Böckmann), Bolley, and Post,

in that he presents his subject matter in such a way as to emphasize rather the general usefulness of the methods described than to present schemes for the analysis of particular bodies, although the application of the methods to special cases is adequately treated. On the other hand, Classen's work differs from those of Fresenius and Carnot, in that he has prepared the book for the use of technical chemists and advanced students to whom the general operations of analytical chemistry, such as weighing, filtering, and the like, are known. These are, therefore, omitted, and he proceeds at once to the description of particular methods.

The present volume includes only the metals and metalloids. Methods suitable for the qualitative detection of each are described, followed by procedures for their quantitative determination by volumetric, gravimetric, colorimetric or electrolytic methods, the selection having been determined upon, he states, only after tests made by him, his assistants or pupils, or, in some instances, after he had become convinced of the accuracy of the processes through published criticism. The descriptions of the procedures for the determination of the metals are, in turn, followed by those of methods for such separations from other elements as occur in ordinary analytical practice, and, in addition to the foregoing, special schemes are given for the analysis of bodies of technical importance, such as irons and steels, aluminum and its alloys, cements, clays, glasses, zinc ores and zinc dust, chrome iron ore and chrome steel, uranium ores, platinum ores and residues, 'osmiridium,' 'platiniridium,' fertilizers, liquid ammonia, ammoniacal liquors, and a scheme for rock analysis.

The value of this book as a work of reference is also much enhanced by the introduction of matter relating to the rarer elements. The methods described for the separation of the rare earths by fractional precipitation and the analysis of monazite sand, as well as of the materials employed in the manufacture of mantles for incandescent lamps, appear to be specially complete.

The author deplores the general absence in text-books and journals of statements indicating the basis of the stoichiometrical calcula-